Space Weather Forecast

Issued on Wednesday, 04 September 2024 at 01:03 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares expected, slight chance of Strong flares. Slight chance of G1 Geomagnetic storms Day 1 (04 Sep). Increasing chance of S1/Minor Radiation Storm level.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity was Moderate in the past 24hrs, with several M-class flares. The strongest one was an impulsive M3.3 peaking at 03/1602 UTC from a large region in the southeast quadrant. There are nine sunspot regions on the visible disc, three of which are sufficiently large and complex enough to be of interest for the forecast period. The largest region on the southwest of the disc continues to show consolidation of the intermediate region with penumbra here starting to mature, and magnetic complexity developing. A region near south-centre disc has numerous spots, and has also developed magnetic complexity. Finally, the newly arrived region in the far southeast appears to be a large and complex region, but due to foreshortening it is hard to distinguish the exact magnetic configuration at present. This region is showing significant looping in imagery, however. It is also being shortly followed by a further new region close to the limb, which may be magnetically connected and contributing to the looping. All other regions are relatively simple and stable at present.

A halo Coronal Mass Ejection (CME) was observed on satellite imagery around 03/0810UTC. While some dimming was detected, there was no evidence of any flare or filament lift-off associated with this event, leading us to believe that this CME is far-sided. A weak CME was also observed off the northeast limb around 03/2030 UTC and while it is not estimated to be Earth-directed, there is not sufficient imagery to run a detailed analysis. No other Earth directed CMEs have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar wind parameters are indicative of a return to a slow regime. The solar wind speed reduced from 450 to 370 km/s, along with a below average number of particles. The Interplanetary Magnetic Field was moderate but reduced slightly over time and the important the north-south component, Bz, continued to fluctuate but more weakly whilst remaining largely positive. Resulting geomagnetic activity was Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) has been rising in response to the larger flare on 01 Sep, but remains below the S1/Minor Radiation Storm level.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is expected with a slight chance of isolated Strong flares. The main flare risk is currently from any of the three larger sunspot regions in the southern hemisphere.

Solar Wind / Geomagnetic Activity: A large CME off the southeast limb on 01 Sep is

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expected to mostly pass well behind Earth's orbit, but glancing impacts at Earth cannot be ruled out. Confidence is low but impacts could be felt on Day 1 (04 Sep). Two coronal holes are currently present on the western hemisphere, CH67/- and CH/65/+. The HSS associated with the negative coronal hole may enhance the solar wind on Day 3 (06 Sep) and the HSS associated with the positive one on Day 4 (07 Sep).

On the whole, mainly Quiet to Unsettled (Kp 1-3) activity is expected but there is a slight chance of G1/Minor Storm intervals (Kp 5) on Day 1.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is currently above background levels, but below the S1/Minor Radiation Storm threshold. There is a slightly increasing chance of exceeding S1 in the coming days.

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	80	80	80
Very Active	R3 to R5 X	No	25	25	25	25

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	25	25
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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